

Effect of 2D photonic crystal slab with C_{3v} symmetry on introduction of asymmetry for the vertical direction

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We previously proposed a photonic crystal (PC) slab with C_{3v} symmetry in a triangular lattice, which has 2D complete photonic bandgap^[1]. In this symposium, we report on a concrete example of the merit of this structure. In the case of conventional PC slab with circular air holes, when an asymmetry for vertical direction is introduced (see Fig.1(a)), TE-TM mode conversion occurs and Q factors of the cavities formed in PC slab are degraded (see solid circles in Fig.2.). [Note that shallow holes are expected to improve the pattern of radiation from the cavity to the free space^[2]]. On the other hand, when we employ C_{3v} symmetry (see Fig.1(b)), Q factors are found not to be degraded (see solid triangles in Fig.2.).

[1] H. Kitagawa, T. Asano and S. Noda, PECS-V, March, 22 (2004).

[2] Y. Tanaka, et al., 3p-ZC-2, the 65th Autumn Meeting, JSAP (2004).

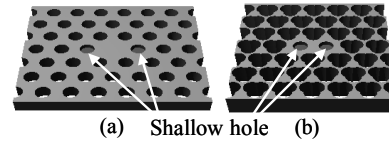


Fig.1. Two types of 2D PC slabs with a nanocavity. Shallow holes produce vertical asymmetry.

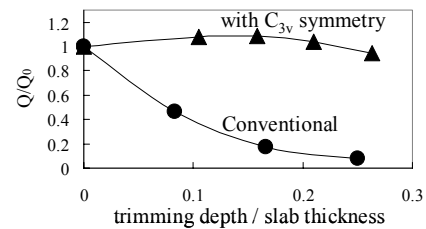


Fig.2. Variation of Q factors as a function of trimming depth of shallow holes. Q_0 is bare Q factor.